Check Digit Calculation Routine

The check digit calculation is based on the first 53 characters of the scan line. The 54th position of the scan line will become the check digit.

This subroutine assumes that the only characters being used are those found in the table below, plus I, O, S, V, Z, and blank. Anything else is considered to be a special character and will produce incorrect results.

The check digit calculation routine follows on page 3 of the specifications.

Using the following scan line as an example, the check digit calculation instructions follow -

```
Character  12345678911111111112222222222333333333344444444445555
Count                 012345678901234567890123456789012345678901234

SCANLINE   00910104200114214500112310101150200000000000GRAH000040

Index      12345678912345678912345678912345678912345678912345678
```

1. Assign an index value to **EVERY** character in the scan line, starting with '1', incrementing by '1'. After the index reaches '9', start over with '1'.	I, O, S, V, Z and blank are assigned an index but will be skipped in the calculation process that follows.
2. Using the conversion table attached, find the appropriate value for the scan line character.	0 has a value of 10, 9 has a value of 9…. 'G' has a value of 17
3. Multiply the value for each scan line character by that scan line character's index.	For the first 4 characters …… 10 * 1 = 10 10 * 2 = 20 9 * 3 = 27 1 * 4 = 4 …and so on ……. When the 'G' in encountered, it would be 17 * 8 = 136 ('G' has a value of 17 in the table and an index of 8)
4. Add each product from step 3 to an accumulator.	10 + 20 + 27 + 4 +……..…136 + ….. Total for the above scan line = 1873
5. Divide the total from step 4 by 31.	1873 / 31 = 60, remainder 13
6. Subtract the remainder (determined in step 5) from 31.	31 – 13 = 18
7. Find the result from step 6 in the table below to determine check digit.	18 equates to check digit of 'H'

COMPLETED

SCANLINE 0910104200114214500112310101150200000000000GRAH000040**H**

Note: In the following scan line, the ‘O’ in ‘KNOX’ has no value for step 3 but has an index.

SCANLINE **009101032002122032001123101091701000000000KNOX000030**

COMPLETED
SCANLINE 009101032002122032001123101091701000000000KNOX000030**E**

Index 123456789123456789123456789123456789123456789123456789

Conversion table for steps 2 and 7 -

Step 2 Scan line character Assigned	Value
Step 7 Check digit	Result from step 6
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
0	10
A	11
B	12
C	13
D	14
E	15
F	16
G	17
H	18
J	19
K	20
L	21
M	22
N	23
P	24
Q	25

R	26
T	27
U	28
W	29
X	30
Y	31

01 WS-SCAN-LINE. (54 characters in length)
- 05 SL-REV-CODE PIC 9(4).
  '0091' for quarterly coupons
  '0001' for extension form
- 05 SL-SUB-TYPE PIC 99.
  '01' for quarterly coupons
  '26' for extension form
- 05 SL-FILE-FREQ PIC 99.
  '01' thru '04' for the quarterly coupons, respectively
  '05' for the extension form
- 05 SL-TP-PRE PIC 9. **Value '2'**.
- 05 SL-TP-ID PIC 9(9).
- 05 SL-TP-SEQ PIC 9(3). **Value '001'**.
- 05 SL-TAXABLE-YR.
  - 10 SL-TAX-MMDD PIC X(4). **Value '1231'**.
  - 10 SL-TAX-YY PIC XX. **Tax year for which coupons are for**
- 05 SL-DUE-DATE PIC 9(6). **Table-driven**
- 05 SL-AMT-DUE PIC 9(10). **zeroes**
- 05 SL-NAME PIC X(4). **First 4 letters of last name**.
- 05 FILLER PIC 9(3).
- 05 SL-DOC-TYPE PIC 99.
  '01' thru '04' for the quarterly coupons, respectively
  '05' for the extension form
- 05 FILLER PIC 9.
- 05 SL-CHK-DIGIT PIC X. **Derived from check-digit calculation subroutine**

Scan Line Positioning and Coupon Size Parameters

- Coupons should be produced on ***8 ½ x 11*** sheets divided into 3 equal parts. *(3 coupons per sheet)*
- Coupon Width (horizontal) ***8.50*** inches. Coupon Length (vertical) ***3.67*** inches *(rounded).*
- Bottom of each scan line is positioned at ***2.625*** inches from the bottom edge of each coupon.
- Begin scan line at ***1.25*** inches from the left edge of the coupon.
- Must have minimum of ***.25*** inches of white space above and below each scan line.
- Font Size ***OCRA-AN***